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 application for evaluation and measurement of display or print output

Relationship brightness P_{T1} and luminance L_T as function of tristimulus value Y_T for the adaptation luminance $L_A=1000\text{cd/m}^2$

$$B_{T1}(L_T, L_A, L_{\infty}) = C_Y(\rho) L_T^2 - B_{T1}(L_{\infty}) \quad \text{brightness } P_{T1} [1]$$

$$B_{T1}(L_{\infty}) = C_Y(\rho) [S(\rho) + S_Y(L_{\infty})^2] \quad (n=0.31) \quad [2]$$

$$L_T(L_{\infty}, \rho) = C_Y(\rho) S_Y(L_{\infty})^{1/n} \quad \text{(t-black threshold)} [3]$$

$$L_T \quad Y_T \quad C_Y(\rho) \quad S(\rho) \quad S_Y(\rho) \quad B_{T1}(L_{\infty}) \quad P_{T1} \quad L_{T1} \quad L_{T2} \quad L_{T3}$$

1000	120	22.969	0.0718	0.2448	49.51	145.98	11.91	83.94		
1000	100	23.128	0.0747	0.2494	49.15	145.98	11.91	83.94		
1000	90	23.415	0.0866	0.2526	49.51	146.02	12.68	78.86		
1000	60	23.973	0.1313	0.2657	49.51	146.39	13.85	52.15		
1000	30	26.235	0.1797	0.3188	49.51	146.66	16.16	39.88		
1000	20	27.971	0.2013	0.3555	49.51	147.37	30.00	32.46		
1000	10	30.747	0.2730	0.3984	49.51	147.78	43.81	22.82		
1000	120	22.969	0.0718	0.2448	49.51	145.98	11.91	83.94		

hues: 0 [1] L: 300, L_A: 1000, q: 120, R: 34.00, B_{T1}: 49.51

Relationship brightness P_{T1} and luminance L_T as function of tristimulus value Y_T for the adaptation luminance $L_A=1000\text{cd/m}^2$

$$B_{T1}(L_T, L_A, L_{\infty}) = s_0(L_{\infty}) L_T^2 - d_{T1}(L_{\infty}) \quad \text{brightness } P_{T1} [1]$$

$$B_{T1}(L_{\infty}) = C_Y(\rho) [S(\rho) + S_Y(L_{\infty})^2] \quad (n=0.31) \quad [2]$$

$$s_0(\rho) = C_Y(\rho) [3] \quad d_{T1}(\rho) = B_{T1}(L_{\infty}) [4] \quad \text{(scaling factor)}$$

$$L_T \quad Y_T \quad C_Y(\rho) \quad S(\rho) \quad S_Y(\rho) \quad B_{T1}(L_{\infty}) \quad P_{T1} \quad s_0(\rho) \quad d_{T1}(\rho)$$

1000	120	22.969	0.0718	0.2448	49.51	145.98	22.96	49.51		
1000	100	23.128	0.0747	0.2494	49.15	145.98	22.96	49.51		
1000	90	23.415	0.0866	0.2526	49.51	146.02	23.12	50.82		
1000	60	23.973	0.1313	0.2657	49.51	146.39	24.11	52.89		
1000	30	26.235	0.1797	0.3188	49.51	146.66	25.37	50.82		
1000	20	27.971	0.2013	0.3555	49.51	147.37	26.23	52.90		
1000	10	30.747	0.2730	0.3984	49.51	147.78	27.97	50.28		
1000	120	22.969	0.0718	0.2448	49.51	145.98	22.96	49.51		

hues: 0 [1] L: 300, L_A: 1000, q: 120, R: 34.00, B_{T1}: 49.51, S₀: 22.96, d_{T1}: 49.51

Relationship brightness P_{T1} and luminance L_T as function of tristimulus value Y_T for the adaptation luminance $L_A=40\text{cd/m}^2$

$$B_{T1}(L_T, L_A, L_{\infty}) = C_Y(\rho) L_T^2 - B_{T1}(L_{\infty}) \quad \text{brightness } P_{T1} [1]$$

$$B_{T1}(L_{\infty}) = C_Y(\rho) [S(\rho) + S_Y(L_{\infty})^2] \quad (n=0.31) \quad [2]$$

$$L_T(L_{\infty}, \rho) = C_Y(\rho) S_Y(L_{\infty})^{1/n} \quad \text{(t-black threshold)} [3]$$

$$L_T \quad Y_T \quad C_Y(\rho) \quad S(\rho) \quad S_Y(\rho) \quad B_{T1}(L_{\infty}) \quad P_{T1} \quad L_{T1} \quad L_{T2} \quad L_{T3}$$

40	120	22.969	0.0718	0.2448	19.29	52.77	0.56	70.18		
40	100	23.128	0.0747	0.2494	19.29	52.77	0.56	70.18		
40	90	23.415	0.0866	0.2526	19.29	52.36	0.71	55.89		
40	60	23.973	0.1313	0.2657	19.29	52.08	0.89	44.82		
40	30	26.235	0.1797	0.3188	19.29	51.35	1.70	23.42		
40	20	27.971	0.2013	0.3555	19.29	50.93	2.43	16.45		
40	10	30.747	0.2730	0.3984	19.29	49.64	3.88	10.29		
40	120	22.969	0.0718	0.2448	19.29	52.77	0.56	70.18		

hues: 0 [1] L: 300, L_A: 40, q: 120, R: 19.29, B_{T1}: 52.77

Relationship brightness P_{T1} and luminance L_T as function of tristimulus value Y_T for the adaptation luminance $L_A=40\text{cd/m}^2$

$$B_{T1}(L_T, L_A, L_{\infty}) = s_0(L_{\infty}) L_T^2 - d_{T1}(L_{\infty}) \quad \text{brightness } P_{T1} [1]$$

$$B_{T1}(L_{\infty}) = C_Y(\rho) [S(\rho) + S_Y(L_{\infty})^2] \quad (n=0.31) \quad [2]$$

$$s_0(\rho) = C_Y(\rho) [3] \quad d_{T1}(\rho) = B_{T1}(L_{\infty}) [4] \quad \text{(scaling factor)}$$

$$L_T \quad Y_T \quad C_Y(\rho) \quad S(\rho) \quad S_Y(\rho) \quad B_{T1}(L_{\infty}) \quad P_{T1} \quad s_0(\rho) \quad d_{T1}(\rho)$$

40	120	22.969	0.0718	0.2448	19.29	52.77	0.56	70.18		
40	100	23.128	0.0747	0.2494	19.29	52.77	0.56	70.18		
40	90	23.415	0.0866	0.2526	19.29	52.36	0.71	55.89		
40	60	23.973	0.1313	0.2657	19.29	52.08	0.89	44.82		
40	30	26.235	0.1797	0.3188	19.29	51.35	1.70	23.42		
40	20	27.971	0.2013	0.3555	19.29	50.93	2.43	16.45		
40	10	30.747	0.2730	0.3984	19.29	49.64	3.88	10.29		
40	120	22.969	0.0718	0.2448	19.29	52.77	0.56	70.18		

hues: 0 [1] L: 300, L_A: 40, q: 120, R: 19.29, B_{T1}: 52.77, S₀: 0.56, d_{T1}: 70.18

Relationship brightness P_{T2} and luminance L_T as function of tristimulus value Y_T for the adaptation luminance $L_A=1000\text{cd/m}^2$

$$B_{T2}(L_T, L_A, L_{\infty}) = [C_Y(\rho) L_T^2 - B_{T2}(L_{\infty})] P_{T2} \quad \text{brightness } P_{T2} [1]$$

$$B_{T2}(L_{\infty}) = C_Y(\rho) [S(\rho) + S_Y(L_{\infty})^2] \quad (n=0.31, P_{T2} = 1/P_{T1}) [2]$$

$$L_T(L_{\infty}, \rho) = [S(\rho) + S_Y(L_{\infty})^2]^{1/n} P_{T2} \quad \text{(t-black threshold)} [3]$$

$$Y_T \quad Y_C \quad C_Y(\rho) \quad S(\rho) \quad S_Y(\rho) \quad B_{T2}(L_{\infty}) \quad P_{T2} \quad L_{T1} \quad L_{T2} \quad L_{T3}$$

1000	120	22.969	0.0718	0.2448	34.60	110.21	8.15	83.94		
1000	100	23.128	0.0747	0.2494	34.60	110.21	8.15	83.94		
1000	90	23.415	0.0866	0.2526	34.60	110.49	8.68	78.86		
1000	60	23.973	0.1313	0.2657	34.60	110.02	9.49	72.15		
1000	30	26.235	0.1797	0.3188	34.60	110.02	11.43	59.88		
1000	20	27.971	0.2013	0.3555	34.60	116.14	21.10	32.46		
1000	10	30.747	0.2730	0.3984	34.60	119.29	30.01	22.82		
1000	120	22.969	0.0718	0.2448	34.60	110.21	8.15	83.94		

hues: 0 [1] L: 300, L_A: 1000, q: 120, R: 34.60, B_{T2}: 110.21

Relationship brightness P_{T2} and luminance L_T as function of tristimulus value Y_T for the adaptation luminance $L_A=1000\text{cd/m}^2$

$$B_{T2}(L_T, L_A, L_{\infty}) = s_0(L_{\infty}) L_T^2 - d_{T2}(L_{\infty}) \quad \text{brightness } P_{T2} [1]$$

$$B_{T2}(L_{\infty}) = C_Y(\rho) [S(\rho) + S_Y(L_{\infty})^2] \quad (n=0.31, P_{T2} = 1/P_{T1}) [2]$$

$$s_0(\rho) = C_Y(\rho) [3] \quad d_{T2}(\rho) = B_{T2}(L_{\infty}) [4] \quad \text{(scaling factor)}$$

$$Y_T \quad Y_C \quad C_Y(\rho) \quad S(\rho) \quad S_Y(\rho) \quad B_{T2}(L_{\infty}) \quad P_{T2} \quad s_0(\rho) \quad d_{T2}(\rho)$$

1000	120	22.969	0.0718	0.2448	34.60	110.21	8.15	83.94		
1000	100	23.128	0.0747	0.2494	34.60	110.21	8.15	83.94		
1000	90	23.415	0.0866	0.2526	34.60	110.49	8.68	78.86		
1000	60	23.973	0.1313	0.2657	34.60	110.02	9.49	72.15		
1000	30	26.235	0.1797	0.3188	34.60	110.02	11.43	59.88		
1000	20	27.971	0.2013	0.3555	34.60	116.14	21.10	32.46		
1000	10	30.747	0.2730	0.3984	34.60	119.29	30.01	22.82		
1000	120	22.969	0.0718	0.2448	34.60	110.21	8.15	83.94		

hues: 0 [1] L: 300, L_A: 1000, q: 120, R: 34.60, B_{T2}: 110.21, S₀: 8.15, d_{T2}: 83.94

Relationship brightness P_{T2} and luminance L_T as function of tristimulus value Y_T for the adaptation luminance $L_A=40\text{cd/m}^2$

$$B_{T2}(L_T, L_A, L_{\infty}) = [C_Y(\rho) L_T^2 - B_{T2}(L_{\infty})] P_{T2} \quad \text{brightness } P_{T2} [1]$$

$$B_{T2}(L_{\infty}) = C_Y(\rho) [S(\rho) + S_Y(L_{\infty})^2] \quad (n=0.31, P_{T2} = 1/P_{T1}) [2]$$

$$L_T(L_{\infty}, \rho) = [S(\rho) + S_Y(L_{\infty})^2]^{1/n} P_{T2} \quad \text{(t-black threshold)} [3]$$

$$Y_T \quad Y_C \quad C_Y(\rho) \quad S(\rho) \quad S_Y(\rho) \quad B_{T2}(L_{\infty}) \quad P_{T2} \quad L_{T1} \quad L_{T2} \quad L_{T3}$$

40	120	22.969	0.0718	0.2448	34.60	70.99	1.07	70.18		
40	100	23.128	0.0747	0.2494	34.60	70.17	1.15	65.89		
40	90	23.415	0.0866	0.2526	34.60	70.17	1.15	65.89		
40	60	23.973	0.1313	0.2657	34.60	65.81	1.69	44.82		
40	30	26.235	0.1797	0.3188	34.60	65.15	3.23	23.42		
40	20	27.971	0.2013	0.3555	34.60	71.41	6.69	16.45		
40	10	30.747	0.2730	0.3984	34.60	70.87	7.16	10.29		
40	120	22.969	0.0718	0.2448	34.60	70.99	1.07	70.18		

hues: 0 [1] L: 300, L_A: 40, q: 120, R: 34.60, B_{T2}: 70.99

Relationship brightness P_{T2} and luminance L_T as function of tristimulus value Y_T for the adaptation luminance $L_A=40\text{cd/m}^2$

$$B_{T2}(L_T, L_A, L_{\infty}) = s_0(L_{\infty}) L_T^2 - d_{T2}(L_{\infty}) \quad \text{brightness } P_{T2} [1]$$

$$B_{T2}(L_{\infty}) = C_Y(\rho) [S(\rho) + S_Y(L_{\infty})^2] \quad (n=0.31, P_{T2} = 1/P_{T1}) [2]$$

$$s_0(\rho) = C_Y(\rho) [3] \quad d_{T2}(\rho) = B_{T2}(L_{\infty}) [4] \quad \text{(scaling factor)}$$

$$Y_T \quad Y_C \quad C_Y(\rho) \quad S(\rho) \quad S_Y(\rho) \quad B_{T2}(L_{\infty}) \quad P_{T2} \quad s_0(\rho) \quad d_{T2}(\rho)$$

40	120	22.969	0.0718	0.2448	34.60	70.99	1.07	70.18		
40	100	23.128	0.0747	0.2494	34.60	70.17	1.15	65.89		
40	90	23.415	0.0866	0.2526	34.60	70.17	1.15	65.89		
40	60	23.973	0.1313	0.2657	34.60	65.81	1.69	44.82		
40	30	26.235	0.1797	0.3188	34.60	65.15	3.23	23.42		
40	20	27.971	0.2013	0.3555	34.60	71.41	6.69	16.45		
40	10	30.747	0.2730	0.3984	34.60	70.87	7.16	10.29		
40	120	22.969	0.0718	0.2448	34.60	70.99	1.07	70.18		

hues: 0 [1] L: 300, L_A: 40, q: 120, R: 34.60, B_{T2}: 70.99, S₀: 1.07, d_{T2}: 70.18

Relationship brightness P_{T1} and luminance L_T as function of tristimulus value Y_T for the adaptation luminance $L_A=200\text{cd/m}^2$

$$B_{T1}(L_T, L_A, L_{\infty}) = C_Y(\rho) L_T^2 - B_{T1}(L_{\infty}) \quad \text{brightness } P_{T1} [1]$$

$$B_{T1}(L_{\infty}) = C_Y(\rho) [S(\rho) + S_Y(L_{\infty})^2] \quad (n=0.31) \quad [2]$$

$$L_T(L_{\infty}, \rho) = C_Y(\rho) S_Y(L_{\infty})^{1/n} \quad \text{(t-black threshold)} [3]$$

$$L_T \quad Y_T \quad C_Y(\rho) \quad S(\rho) \quad S_Y(\rho) \quad B_{T1}(L_{\infty}) \quad P_{T1} \quad L_{T1} \quad L_{T2} \quad L_{T3}$$

200	120	22.969	0.0718	0.2448	30.71	87.98	2.55	78.36		
200	100	23.128	0.0747	0.2494	30.71	87.98	2.55	78.36		
200	90	23.415	0.0866	0.2526	30.71	87.89	3.05	63.51		
200	60	23.973	0.1313	0.2657	30.71	87.81	3.71	53.51		
200	30	26.235	0.1797	0.3188	30.71	87.63	6.99	28.58		
200	20	27.971	0.2013	0.3555	30.71	87.19	15.35	13.02		
200	10	30.747	0.2730	0.3984	30.71	87.19	15.35	13.02		
200	120	22.969	0.0718	0.2448	30.71	87.98	2.55	78.36		

hues: 0 [1] L: 300, L_A: 200, q: 120, R: 30.71, B_{T1}: 87.98, S₀: 2.55, d_{T1}: 78.36

Relationship brightness P_{T1} and luminance L_T as function of tristimulus value Y_T for the adaptation luminance $L_A=200\text{cd/m}^2$

$$B_{T1}(L_T, L_A, L_{\infty}) = s_0(L_{\infty}) L_T^2 - d_{T1}(L_{\infty}) \quad \text{brightness } P_{T1} [1]$$

$$B_{T1}(L_{\infty}) = C_Y(\rho) [S(\rho) + S_Y(L_{\infty})^2] \quad (n=0.31) \quad [2]$$

$$s_0(\rho) = C_Y(\rho) [3] \quad d_{T1}(\rho) = B_{T1}(L_{\infty}) [4] \quad \text{(scaling factor)}$$

$$L_T \quad Y_T \quad C_Y(\rho) \quad S(\rho) \quad S_Y(\rho) \quad B_{T1}(L_{\infty}) \quad P_{T1} \quad s_0(\rho) \quad d_{T1}(\rho)$$

200	120	22.969	0.0718	0.2448	30.71	87.98	2.55	78.36		
200	100	23.128	0.0747	0.2494	30.71	87.98	2.55	78.36		
200	90	23.415	0.0866	0.2526	30.71	87.89	3.05	63.51		
200	60	23.973	0.1313	0.2657	30.71	87.81	3.71	53.51		
200	30	26.235	0.1797	0.3188	30.71	87.63	6.23	28.58		